Responses to Comments from the City of New York on the Response to Comments on the Draft Feasibility Study (FS) Report

City of New York

Sewer Line Excavation – The draft FS Alternatives 2, 3, and 4 propose the removal and replacement of the entire sewer line on Irving Avenue from the connection at the Wolff Alport property, on the Cooper Avenue line (up-gradient from the manhole Irving Avenue and Cooper Avenue intersection), to the Irving Avenue and Halsey Street intersection, and ending at the Halsey Street and Wyckoff Avenue intersection. Draft FS page 3-2. These alternatives also propose excavating surrounding soils to a minimum depth of two feet under the sewer pipe. Id.

1. **Comments on Response to Comment 103 - Correlation Data**
   In its June 6th email, EPA stated that a gamma count rate of 10,000 count per minute (cpm) is considered to be approximately equal to 5 pCi/g, which is the preliminary remediation goal (PRG) for Ra-226 and Th-232, and that exceeded this action level after one round of flushing would be the basis for determining the length of sewer line to be removed.

   It is unclear whether this is the appropriate correlation because the correlation data showing that 10,000 cpm in any measured geometry or environment was not provided. The basis and justification for using the correlation as criteria to remove soils, sewer lines, and other infrastructure should be provided and substantiated, including, at the very least, the type of instrument, its sensitivity, presumed geometry factors, background contribution to count rate, the variation of composition and properties in anthropogenic materials encountered, and scan count rate sensitivity verses static count efficiency, as well as a definition of the statistical uncertainty in the use of such a method. This is common practice at all site closure actions and is required by MARSSIM for remedial action justifications.

   Moreover, the sole reliance on this correlation to determine whether a sewer should be replaced appears to be overly simplified and potentially erroneous, especially in light of the high financial, environmental, safety, and social impacts relating to removal and replacement of sewers. The removal of sewer lines, and other infrastructure based solely on count rate correlation does not adequately determine that a specific concentration of radionuclides of potential concern (ROPC) are present either in, under or near the sewer line. In addition, it has not been demonstrated that a worker in the sewer would or would not exceed any risk or exposure limit based upon use of this criteria. According to the New York City Department of Environmental Protection (NYCDEP), workers spend limited time in these sewers. These sewers are small in size and are generally maintained and cleaned with mechanical equipment operated from the surface. Furthermore, manhole maintenance is infrequent and would typically require less than an hour of time spent in the sewer. In contrast, worker time in the sewer and trenches would be extensive if sewer removal and replacement were required. Depending on construction means and methods, workers would be required to spend potentially days to weeks in the trench dug to replace the

sewer. Trenchless technologies like lining should be considered as potentially viable options instead.

It should also be noted that the unnecessary removal of the sewer lines and surrounding soils will necessitate significant collateral actions including the removal, or relocation and replacement of other subsurface structures including water mains and other private and public infrastructure. Beyond the obvious economic, environmental, and social impacts of these actions, the resulting health and safety impacts to workers and the public have not been considered and quite possibly may outweigh the small human health risks identified for future and current site receptors under current conditions.

Response: We agree that there is not a direct correlation between the 10,000 cpm and 5 picocuries per gram (pCi/g) values. However, at approximately three to eight times the background values found during the background sewer investigation, the 10,000 cpm value is significantly greater than background levels. The available sample data and locations show that at counts greater than 10,000 cpm, contamination is present with concentrations typically greater than 5 pCi/g. As a result, the 10,000 cpm value provides a starting point for delineating areas that have potentially been impacted and require further investigation.

EPA's goal is to remove all contaminated material above the PRGs and ultimately delete the site from the National Priorities List (NPL). Leaving contamination above the PRGs will require the use of institutional controls, which is not the preferred alternative for this site. Because the radioactive half-life of Th-232 is 14 billion years, the institutional controls would need to be managed in perpetuity. Ensuring such controls remain effectively in place can be difficult. Therefore, EPA proposes the following approach for the sewer line:

Following completion of sewer jet cleaning, a gamma survey would be performed within the flushed sewer to determine if high gamma counts (i.e., above 10,000 cpm) are still present. Any portions of the sewer line where gamma counts are still greater than 10,000 cpm would undergo further investigation including bedding and sewer material sampling to determine the level and extent of contamination. Those portions of the sewer line, along with contaminated bedding material that exceed PRGs would be removed and replaced.

While the removal of the contaminated sewer pipe might present some limited risk to remediation workers through exposure to radiologically-contaminated materials through the building demolition and soil excavation activities, the risks to on-site workers could be minimized by utilizing proper protective equipment.

2. **<u>Comments on Response to Comment 103 – Contaminated Material in Construction Material</u>**

EPA asserts that material in the manhole from sewer pipe I-1 to I-4 exhibit radionuclide concentrations greater than 2,500 pCi/g embedded in the construction materials and that it is conservatively assumed that the entire length of the sewer has contamination in the construction materials. EPA should clarify the basis of this conclusion and whether it was based upon a single clay sewer pipe sample, which would not be adequate to draw such a conclusion, or several samples from sewer materials along the length of the system, as would be more appropriate. Regardless, the existing data does not indicate high levels of embedded contamination in the brick. The highest levels of contamination are at manholes

I-1 and I-4, which are located near the contaminant input point of origin, with large variations in both exposure rates and gamma readings in downstream manholes beginning with I-4 and ending at I-6. The remaining manholes showed generally declining radiation levels with distance from the source. The large variations and the presence of outliers, assuming a consistent flow pattern for the system, brings into question whether the radiation readings were accurate and representative, and/or demonstrates that environmental factors influenced the scouring and retention of materials at each section of the sewer system. Due to the large variations, imbedded contamination retention is uncertain and has not been demonstrated given sewer sections of similar materials and widely variable readings even close to the source.

Given the variations in readings, surface contamination of sewer materials should have been investigated to determine how easily embedded material could be removed (e.g what Decontamination Factors (DF) were reasonably achievable, and how geometry and depth were influencing gamma readings). In addition, the impact of sewer line configuration and flow patterns upon the accumulation of sediment and contamination should also have been investigated. This information could have been obtained during typical field studies and would be valuable for qualifying the data before making remedial action decisions. Further the assumption that radiation readings are derivative of contaminated bedding materials beneath the sewers, without additional data to demonstrate this (such as sewer material shielding factors, flow patterns and investigation of leak sources), is invalid as would be the risk or dose attributed to workers based on this assumption.

Response: Radionuclide contamination within the sewer pipes and the manholes is present in sediments and construction materials in the sewer manholes near the WACC property significantly above the PRG established for Ra-226 and Th-232. Three samples of sewer material samples were collected from I-2 and I-4. The sewer material sample results from this portion of the sewer showed Ra-226 concentrations ranging from 76 pCi/g to 163 pCi/g, and Th-232 concentration ranging from 2,206 pCi/g to 2,536 pCi/g. Based on these sample data, it is clear that the clay pipe sewer line is highly contaminated, and therefore, the sewer line approach assumes that the clay pipe sewer line beginning at Manhole I-1 on Irving Avenue southwest of the WACC property and extending northwest to Manhole I-4 would require removal. The remaining portion of the sewer line with gamma counts greater than 10,000 cpm would be addressed as per the clarified approach discussed in response to comment 103.

3. **<u>Comments on Response to Comment 103 – Revised sewer approach</u>**
As stated above, the City appreciates EPA's reconsideration of flushing and pressure washing technologies to determine decontamination potential before making risk or remediation determinations. The City offers the following steps comments and suggestions to EPA's proposed approach.

Step 1-Remove all clay sewer pipes
The City recommends that the section of the pipe identified for removal first be flushed, power washed, or be subject to other exposure reduction methods (i.e., lining the pipe, etc.) prior to a determination that they be removed. This could result in reduced costs, reduced risks, and reduced social impacts while still adequately addressing existing contamination.

Step 2 -Sediment removal and flushing
Vacuuming or flushing of sediment should be accompanied by power washing and done in a manner that minimizes the spread of contamination to lower activity areas when possible. This can be accomplished by closing off sections while other sections are vacuumed, collecting material in lower elevations and then removing.

Step 3- Perform a gamma survey within the flushed sewer
The City instead recommends that EPA evaluate the radiological impacts of cleaning operations, and the consequential reduction in risk. While gamma readings should be used to identify general area radiation levels, those levels should not be the only factors relied upon without first understanding the correlation of the instrument readings to the actual activity and dose rate levels of ROPC in the sewer environment. As noted in the HHRA, the pathways used to estimate risk include among others, ingestion and inhalation. If flushing and or washing are effective to any measure, certain pathways may be eliminated or significantly reduced as a result of lower activity levels or the lack of removable contamination among other factors. This would then require that exposure and risk to plausible receptors should be evaluated for residual levels under realistic exposure durations and conditions.

Step 4-If gamma counts are still greater than twice those in background sewers those parts of the sewer line would be removed
As indicated above, the City believes it is not justifiable to remove sewer lines exceeding twice background based on an unqualified gamma count rate limit leading to an estimated risk to receptors. The HHRA demonstrated short duration exposures for utility workers justify the imposition of institutional controls to ensure compliance with dose and risk criteria. The comparative analysis of both the proposed alternative (removal) and the prospective methodologies (decontamination) should be performed to affirm or invalidate the need for institutional controls, removal, or any other such actions at the levels proposed.

Step 5-Sampling of bedding materials to determine if they are contaminated
Although sampling from exposed excavation locations is prudent, it is important to understand the limitations of the data. While “hot spots” may occur, elevated measurement locations are not indicative of the entire system and should be handled as described in MARSSIM for evaluation of the survey unit as a whole. In addition, the contribution to calculated dose or risk from contamination below the sewer pipes should be evaluated in light of the pipe shielding and spatial extent.

Step 6-Cost Estimating
The City repeats its comment that EPA’s cost estimates significantly under-estimates the costs associated with sewer removal. First, as previously stated in the City’s comments on the draft FS, utility removal and replacement will likely be required. At the very least, sewer removal and replacement will require the replacement of corresponding water mains due to the water main’s structural reliance on the sewer system. In addition, and not raised in our May 19th letter, shallow private utilities would also need to be removed or offset due to their being within the influence zone of the sewer trench, rendering them unsupported during the sewer trenching.

Response: As discussed in the response to comment 101, the sewer line from Manhole I-1 to Manhole I-4 would be removed (approximately 120 feet). The remaining portion of the sewer line down to the intersection of Wyckoff Avenue and Halsey Street would undergo jet cleaning using high-pressure water nozzles to flush out dirt, sediments/sludge, and any other matter from the sewer pipeline. Additionally, based on elevated gamma counts, it is assumed that the portion of clay sewer pipe from Manhole C-1 to Manhole I-3 also would undergo jet-cleaning. The jetting would be completed in combination with vacuuming to collect the jetted waste for offsite disposal.

Following completion of sewer jet cleaning, a gamma survey would be performed within the flushed sewer to determine if high gamma counts (*i.e.,* above 10,000 cpm) are still present. Any portions of the sewer line where gamma counts are still greater than 10,000 cpm would undergo further investigation, including bedding and sewer material sampling, to determine the level and extent of contamination. Those portions of the sewer line, along with contaminated bedding material that exceed PRGs, would be removed and replaced. Because the bedding material can provide a preferential path for contamination to migrate, it is possible that contamination from an upstream sewer line breach might exist in the bedding underlying intact piping.

The removal or relocation of utilities (e.g., fiber optic lines, water mains, etc.) is not considered in the cost estimate due to a lack of information on the presence and location of these utilities. However, there is a large contingency included in the cost estimate to account for those items. Please see response to Comment 107 for additional information regarding estimation of costs for the FS alternatives.

4. **<u>Comments on Response to Comment 104</u>**
EPA states that sewer line and sub base removal in any portion of the sewer system is being undertaken to achieve the remedial action objectives (RAOs) for the Site, which is necessary to reduce or eliminate the human exposure threat by exposure to COCs above PRGs. In the case of the sewer system, it was stated that the PRGs are based on a correlation of 10,000 cpm being equivalent to 5 pCi/g of Ra and Th. However, the soil under the sewer pipe must be evaluated under a different use scenario. As stated previously, the gamma correlation and its applicability for risk or dose estimates in this setting, under plausible future use scenarios, has not been shown nor has twice the sewer system background count rate been shown to equate to any specific dose or risk. Sewer system shielding for sub-base contamination that consider factors such as distance from source activity (depth in soil, etc.), moisture effects, receptor duration, or other factors that are identified and evaluated during RESRAD, have not been evaluated in determining a PRG for this environment.

EPA also states that sub-base materials would be removed in 6 inch increments to an infinite depth if so necessary. The City requests that EPA provide support for this depth, since it is likely that surface soils or ground cover would shield any external dose from residual soil concentrations of contaminants of concern (COC) to surface receptors. EPA should provide an exposure calculation for soil contaminants at incremental depths to shows the concentrations of COCs in a soil column that would require removal under future use scenarios and assumed cover materials to meet PRGs.

Response: As noted above, after jet cleaning, a gamma survey would be performed within the flushed sewer, and any portions of the sewer line where gamma counts are still greater than 10,000 cpm would undergo further investigation to determine the level and extent of contamination. Those portions of the sewer line, along with contaminated bedding material that exceed PRGs, would be removed and replaced.

All bedding material that exceeds the PRG would be removed. The feasibility study assumes only a 6-inch depth of bedding material below the sewer line would require excavation, although sampling during the remediation may indicate the need for deeper excavation.

Please see the response to Comment 105 regarding limiting the excavation to a certain depth, and leaving contaminated soil exceeding the PRGs in the subsurface.

5. **Comments on Response to Comment 105**

As explained in the City's May 19th letter, the City does not believe that Alternative 4's proposal to excavate to a depth of 20 feet in the right of way along Irving Avenue is necessary, and instead proposed limiting such excavation to 5 feet. In light of EPA's revised approach of limiting removal and replacement of the sewer line on Irving Avenue to between I-1 and I-4, as explained more fully below, the City proposes that EPA limit excavation in this area to the depth that is required to address sewer line contamination.

The City revises Comment 105 to reflect EPA's revised approach to addressing the sewer contamination, which now only requires the removal and replacement of the sewer line from locations I-1to I-4. Under EPA's revised approach, a portion of the area along Irving Avenue identified as requiring the removal of soil to a depth of 20 feet would also be subject to sewer removal and replacement. The City's May 19th comments on the draft FS advocated limiting excavations in this area to a depth of 5 feet instead of the 20 feet. However, since the sewer line between I-1 and I-4 will be removed, the City believes a more pragmatic approach is to excavate along the length of this sewer line to a depth that is required to address the sewer line contamination. In addition, the sewer line can be considered the demarcation depth of the excavation in this area because, based on the City's experience in this area, there is no realistic future use scenarios that would require access to the soil below this area.

For the remaining areas that are proposed for 20-foot excavation but do not overlap with sewer removal and replacement, the City still recommends limiting excavation to five feet. The depth of excavation around I-1 will need to be determined when more information is available regarding the exact location of the end of the sewer line. While location I-1 is shown on the various site maps in the draft FS, EPA's consultant has stated that it could not locate this manhole during its site investigation and has extrapolated its location from information provided in the Louis Berger & Associates 2010 site investigation report. See draft FS, Figure 3-1. The site maps in the draft FS indicate that this sewer line overlaps with the area identified as requiring excavation to a depth of 20 feet. See draft FS at Figure 3-5. Where the sewer line overlaps with the area proposed for 20-foot excavation along Irving Avenue, that area should be excavated to the depth needed to replace the sewer line.

However, any area that is identified for 20-foot excavation discovered to not require sewer line removal should be limited to 5 feet of excavation.

The City anticipates that the removal of the sewer line could require excavating to a depth of between 8 and 12 feet. However, for all the remaining area identified for 20 feet of excavation where there is no underlying sewer line removal and the NE section of Moffat Street, the City is restating its request that the depth of the excavation in these areas be limited to 5 feet for the reasons previously provided in the City's comments of May 19th comments, namely the disruption to existing utilities, the underpinning of existing buildings and shoring requirements.

The City feels that these limitations are appropriate because while EPA states that shallower excavation depths decrease the level of protection of human health and the environment, this statement misrepresents the objectives of the CERCLA process. The goal of remediation is not to return a site to pristine conditions, but rather to reduce or eliminate potential exposures to COCs for exposed receptors below PRGs. PRGs are based on risk and/or dose ranges and limits deemed acceptable. Therefore, in the context of PRGs and RAOs, unless an assessment of exposure to a diminished contaminate depth, area, and concentration is evaluated, it is not accurate to state that "decreasing excavation depth decreases the level of protection and requires additional ICs" because while protection may be less against any exposure, some amount of remediation may reduce any exposure to levels below RAOs and regulatory risk or dose limits that would obviate the need for institutional controls in the right of way. As stated in the HHRA, risk assessments considered the spatial extent of the contaminants (i.e., area and volume) on the receptors. EPA should therefore assess potential risks of exposure to a diminished contaminant source resulting from shallower excavations, i.e. to sewer removal depths in those areas where warranted and in the other areas to a depth of 5 feet as described above. This would require reducing the depth, area, and/or concentration (as in the case of diminishing concentrations with depth), as a result of excavation or isolation (cover). This will likely show that at some point during remediation, the amount of residual contamination will be small enough that it will not result in a potential exposure above the PRGs and therefore will meet the site RAOs.

In light of the acknowledgement in the Proposed Plan regarding the increased difficulty presented by the excavation requirements of Alternative 4, the City is restating its request that the EPA limit the excavation depth along Irving Avenue and the Northeast section of Moffat Street.

Response: The purpose of the feasibility study is to identify, develop, screen, and evaluate a range of remedial alternatives for the contaminated media. Alternatives 2 and 3 were developed to meet the RAOs with a mix of excavation of contaminated materials above the PRGs, placement of cover and/or shielding over contaminated material left in-place, and use of institutional controls. Alternative 4 was developed to meet the RAOs by removing all materials with concentrations above the PRGs. To clarify, any contamination left in-place would require institutional controls because concentrations at the site would still exceed the cleanup goals. Because of the longevity of radionuclides, institutional controls would need to be managed in perpetuity. Since institutional controls would be required for contamination remaining below 5 feet in the right-of-way, any future construction to be

completed in the right-of-way would either be restricted or would require an extensive permitting and approval process.

It is acknowledged that implementability of Alternative 4 would be more difficult given excavation depths and volumes compared to Alternatives 1 through 3, however, the long-term effectiveness and permanence of Alternative 4 would not rely on institutional controls for an indefinite period as the other action alternatives would. In addition, Alternative 4 would allow for the deletion of the site from the NPL.

6. **Comments on Response to Comment 107**

The City repeats its request that EPA include in its Alternative 4 analysis the additional costs identified in the City's draft FS comments associated with the proposed work. The City and its agencies have extensive experience and expertise in street and sidewalk excavations, sewer cleaning, and sewer replacement, and are very familiar with the nature of the costs associated with this type of construction work. EPA should also include costs associated with community disruptions and impacts from the proposed construction work. Finally, EPA should take into account the costs of additional work that will be needed for the FSS (Comment 10 response), including the statistics based sampling required by MARRSIM.

Response: The sewer remediation cost estimate has been revised to incorporate the additional costs identified by NYC. Please note that the cost for the sewer remediation line item in the feasibility study only includes the cost for excavation and replacement of the sewer line. The cost for transportation and disposal of the sewer materials is included under a separate line item. The costs for project management and on-site staff during the remedial action are also included under a separate line item. The cost for the final status survey is included as part of site restoration. The cost for removal and replacement of the water main and private utilities (e.g., fiber optic lines, etc.) has not been included in the cost estimate as there is a lack of information for the location/presence of these utilities in the area. However, there is a large contingency included in the cost estimate to account for those items. Please also note that the feasibility cost estimate under CERCLA has an accuracy of -30% to +50%. Therefore, the estimated remediation cost for Alternative 4 could potentially range from $27.2 million to $58.2 million.